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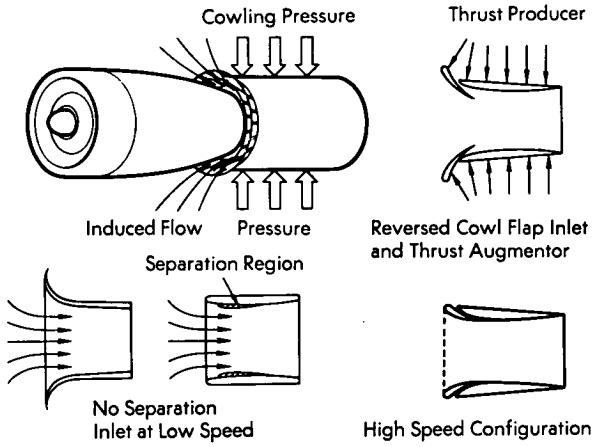
NASA TECH BRIEF

Ames Research Center

Reversed Cowl-Flap Thrust Augmentor

The problem:

To improve the low-speed performance of the inlet (or ejector) of jet engines, especially during takeoff or landing maneuvers.



The solution:

An inlet mouthpiece with a variable geometry made possible by use of a reversed cowl-flap mechanism.

How it's done:

The inlet flare of the induction duct is contoured to prevent sharp turning of streamlines around the lip, and the inlet geometry is in the shape of a ring-wing so that both the open and closed slots are considered for the lip (as in high-speed air foils). As shown by static engine tests, the higher velocity on the inner side of the duct creates a pressure difference across the lip, which is a source for additional engine thrust or the main source of thrust augmentation for an ejector. However, when such an inlet is mounted on an aircraft, the effectiveness of the flare decreases and sometimes becomes a source of drag at high speeds. In the suggested design, maximum thrust can be obtained by means of the reversed cowl-flap because the angle of the flare can be adjusted according to the streamlines created by both the suction and the forward speed.

The reversed cowl-flaps can be adjusted automatically by means of a servo motor driven by a differential pressure cell in order to maintain favorable conditions for streamlines and thrust augmentation. Alternatively, the flaps can be adjusted mechanically, or the system can be operated with pressure taps set so that the pressure on the inlet face is always smaller than the pressure on the back of the inlet.

Note:

Requests for further information may be directed to:

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Reference: TSP 74-10046

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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Category 06